

CLAIMS

What is claimed:

1. A method of testing a circuit on a substrate, comprising:
 - locating the substrate in a transfer chuck;
 - moving a surface of a test chuck into contact with the substrate held by the transfer chuck;
 - securing the substrate to the test chuck;
 - recording an image of a surface of the substrate before having moved off the transfer chuck;
 - moving the test chuck relative to the transfer chuck so that the substrate moves off the transfer chuck;
 - moving terminals on the substrate into contact with contacts to electrically connect the circuit through terminals and the contacts to an electric tester;
 - relaying signals through the terminals and the contacts between the electric tester and the circuit;
 - disengaging the terminals from the contacts; and
 - removing the substrate from the test chuck.

2. The method of claim 1 wherein the image is recorded while the substrate moves off the transfer chuck.

3. The method of claim 2 wherein the image is recorded by an image recordation device which is mounted in a stationary position relative to the transfer chuck.

4. The method of claim 3 wherein, in a direction in which the substrate moves off the transfer chuck, the surface of the test chuck is longer than a distance between a location where the substrate leaves the transfer chuck and a location where the image recordation focuses on the substrate.

5. The method of claim 2 wherein the surface of the test chuck contacts a lower surface of the substrate and the image recordation device is located above an upper surface of the substrate.

6. The method of claim 1 wherein, when the image is recorded, images of surfaces of a plurality of separate substrates are simultaneously recorded.

7. The method of claim 6 wherein the images are recorded while the substrates move off the transfer chuck.

8. The method of claim 7 wherein the images are recorded by an image recordation device which is mounted in a stationary position relative to the transfer chuck.

9. The method of claim 1 further comprising:
heating or cooling the substrate.

10. The method of claim 9 wherein the substrate is heated or cooled after being located on the transfer chuck but before recording of the image.

11. The method of claim 9 wherein the substrate is heated by a thermal conditioning chuck on which the substrate is located.

12. The method of claim 11 wherein the transfer chuck is moved horizontally after heating or cooling of the substrate so as to move the substrate away from the thermal conditioning chuck.

13. The method of claim 11 wherein a surface of the thermal conditioning chuck is moved towards the substrate before being heated or cooled, and moved away from the substrate after the substrate is heated or cooled.

14. The method of claim 11 wherein the substrate is located in a recess of the thermal conditioning chuck.

15. A method of testing a circuit on a substrate, comprising:

locating the substrate in a transfer chuck;

moving an upper surface of a test chuck into contact with a lower surface of the substrate held by the transfer chuck;

securing the substrate to the test chuck;

moving the test chuck in a horizontal direction relative to the transfer chuck so that the substrate moves off the transfer chuck;

recording an image of an upper surface of the substrate by an image recordation device mounted in a stationary position relative to the transfer chuck above the substrate, the upper surface of the test chuck being longer than a distance between a location where the substrate leaves the transfer chuck and a location where the image recordation device focuses on the substrate so that the image is recorded while the substrate moves off the transfer chuck;

moving terminals on the substrate into contact with contacts to electrically connect the circuit through terminals and the contacts to an electric tester;

relaying signals through the terminals and the contacts between the electric tester and the circuit;

disengaging the terminals from the contacts; and
removing the substrate from the test chuck.

16. The method of claim 15 wherein, when the image is recorded images of surfaces of a plurality of separate substrates are simultaneously recorded.

17. The method of claim 15 further comprising:
heating or cooling the substrate.

18. Apparatus for testing a circuit on a substrate, comprising:
a support frame;
a transfer chuck to hold the substrate;
a test chuck located on the frame and being movable relative to the transfer chuck so that a surface thereof moves into contact with the substrate, the substrate being securable to the test chuck, the test chuck being movable relative to the transfer chuck so that the substrate moves off the transfer chuck;
an image recordation device located in a position over the substrate as it moves off the transfer chuck so as to record an image of a surface of the substrate while it moves off the transfer chuck; and
a plurality of contacts secured to the support frame, the test chuck and the contacts being movable relative to one another so that the contacts contact

terminals on the substrate; and

an electric tester connected to the contacts so that signals can be relayed through the terminals and the contacts between the electric tester and the circuit.

19. The apparatus of claim 18 wherein the substrate is located between the surface of the test chuck and the image recordation device when the substrate moves off the transfer chuck.

20. The apparatus of claim 18 wherein, in a direction in which the substrate moves off the transfer chuck, the surface of the test chuck is longer than a distance between a location where the substrate leaves the transfer chuck and a location where the image recordation focuses on the substrate.

21. The apparatus of claim 18 wherein the surface of the test chuck contacts a lower surface of the substrate and the image recordation device is located above an upper surface of the substrate.

22. The apparatus of claim 18 wherein the transfer chuck has a plurality of slots, each capable of holding a separate substrate, and the test chuck has a plurality of surfaces capable of contacting the substrates simultaneously.